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PILOT AGING: A MODERN MEDICAL CHALLENGE

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The purpose of this paper is not to present results of research or clinical studies, but to bring into attention a problem that is rapidly growing in magnitude. It is the usual impression that flying is predominantly an activity for the youthful. Partially, this is the result of the aura of adventure with which flying has been cloaked since man first looked with envy at the birds, but, mostly, it is the summation of the rapid progress of events during this fifty year period since the first successful human flight and of our unwillingness to admit that we are growing old. Most of us can remember our first airplane. All of us can remember our first flight. However, a little honest calculation will verify the fact that, since the air transport industry is well past twenty-five years of age, the young men of twenty, who pioneered commercial aviation, are today at least 45 years of age, and many have passed their fiftieth birthday. McFarland[1] reports (Table I) that, in 1950, of the 8,255 airline pilots, 1.673 were over 40 years of age, 531 over 45 and 175 over 50. In October of this year the Civil Aeronautics Authority[2] had 1,026 valid, commercial licenses issued to persons 60 years of age or older (Table II). This number is increasing so that by 1960 there will be over 5,000 such active licenses. One hundred and eighty-eight of these will be active, airline pilots, 1,212 will be second class or commercially licensed persons, and 3,606 will be private pilots. This last group will largely utilize their private physician for their examination. Hence, the practicing physician will be faced with the determination of the fitness of this group to fly.

TABLE I

AGE DISTRIBUTION OF AIRLINE PILOTS**

Age Group	Number	Cumulative Totals	
40-44	1,142	1,673	40 and over
45-49	356	531	45 and over
50 and over	175	175	50 and over
Total	8,255		

An analysis of these figures makes it clear that the first challenge of the aging pilot is closely related to the entire problem of aging. It is unfortunate that Lansing has to state in his Preface to the Third Edition of Cowdry's Problems of Aging[3], that a spirit of pessimism is present in many of the chapters of this book and it is discouraging when he says "Research on the biology of aging is almost at a standstill."

It is still more unfortunate that the process of aging is even more significant for fliers than for the general population. The pilots have an economic drive to maintain, for a normal life span, their efficiency and earning capacity, and their employers have a significant financial investment in the training and experience which these airmen accumulate. It is significant that only about 13% of commercial pilots are still active after 40 years of age. The remainder have been lost to aviation or have lost aviation as their means of livlihood. This represents the loss of a large capital investment.

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**Modified from McFarland, R.A., 1952

McFarland[1] summarized the biological studies which have been reported on the aging pilot group. The many studies reviewed indicate that this older group of pilots showed no loss in productivity, no accident proneness, a decrease in sickness rates and no effect of aging on their ability to maintain their homeostasis in adjusting to their environment, except in circumstances of severe stress. Parenthetically, this exception may be significant for commercial aviation and is definitely significant in military operations.

The older pilot group reveals a lengthening of reaction times and shows definite changes in such functions as their ability to learn, memory, reasoning and judgment. Compensation takes place, however, for many of these changes, so that deviation does not necessarily indicate deterioration. Actually, flying experience seems to more than make up for these changes with age.

A report[4] from the USAF School of Aviation Medicine provides the information that military aircrewmen, who show adverse signs of aging, have frank symptoms of physical and physiological deterioration, changes in motivation and the ability to learn new skills or to improve others and a lowered performance level at their regular jobs. In addition, they have lowered interpersonal relationships and a tendency to a generally lowered morale.

The most significant changes with age are the loss of sensitivity of the sense organs, particularly in vision. Accommodation, acuity, depth perception and dark adaptation are functions which do deteriorate adversely with advancing age. Obviously, these are functions important to flying operations.

The Air Force pilot is getting older in a manner somewhat analagous to the commercial pilot. In 1947 their average age was about 27. Today, it is close to 35 years. Hence, the problem of the aging pilot in the military services is qualitatively quite similar to that of the aging pilot in commercial and private flying. Unfortunately, the problem is quantitatively more intense in the military situation because of the added stresses of combat and because of the longer, higher and more rapid missions undertaken.

A breakdown of the Air Force population (Figure 1) shows that the officer group's average age is 35 years, while the airmen's average age is between 21 and 22 years of age. A study of the underlying causes of physical disability reveals that each group is subject to an impairment distribution in keeping with that of similar groups from the civilian population. The exceptions to this seem to be a slightly higher than expected incidence of arteriosclerotic heart disease, arthritis and digestive diseases. This serves to emphasize the relationship of the so-called degenerative diseases and aging.

Inasmuch as personal management underlies most Air Force medical problems, rather than simply an understanding of the natural history of disease, the real problem confronting the medical department is not that men grow old. This must be accepted. What actually must be determined are the effects of aging on aircrew performance so that individual fitness can be determined and the deleterious effects of aging avoided.

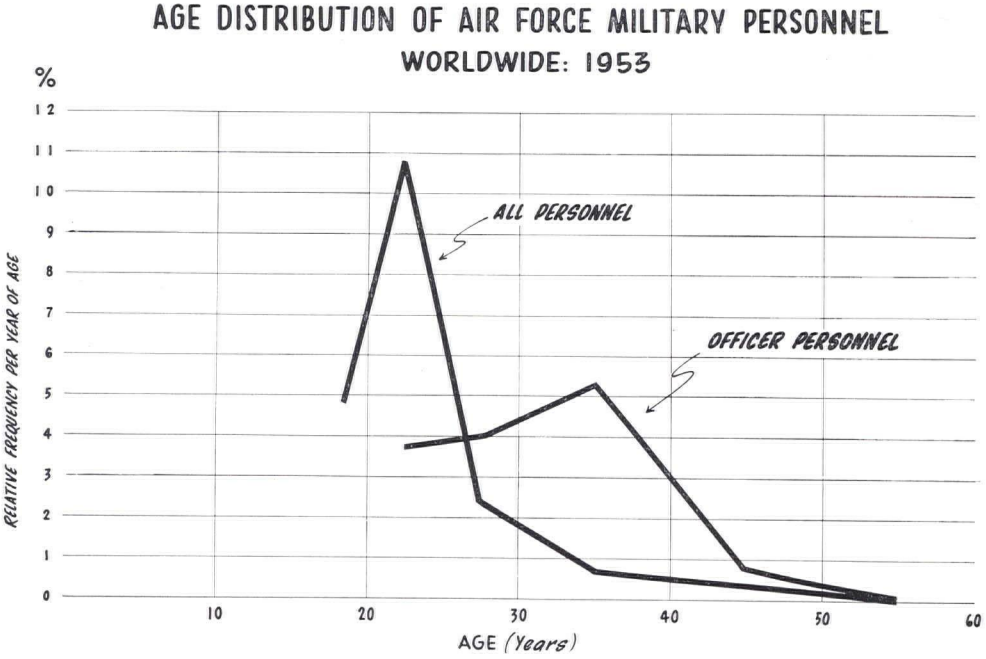
Facetiously, it might be said that the Air Force follows that school of biology which teaches that a cell or body begins to die as soon as it is created or born. It can certainly be stated, factually, that many military directives and orders imply that certain categories of old age have been reached while men are still in their twenties, e.g., 28 years is regarded as a maximum for transition to jet fighter training. Yet such rules

seem to ignore the often proved fact that few aspects of human biology reach their apex before age 20 or 21 and some reach their maximum much later, even after fifty years of life.

In all flying, but particularly in military flying, a nice balance must constantly be reached between youth and experience. It is good for a pilot to be youthful, untroubled and untrampled by responsibility and full of dash and daring. It is mandatory that he have experienced judgment so that he will avoid rash, unconsidered actions.

Much has already been written about the psychology, physiology and medical aspects of aging. The continued need for knowledge emphasizes three areas for study. First, aging is not restricted to man and animals but occurs in all forms of life and in some inorganic forms, such as crystallization of metals. Second, growth in its entirety must be studied, for no certain chronological, cellular age represents senescence. Third, aging is not only a biological problem, in the sense of altered physical and chemical states, but aging is also a sociologic and psychologic problem.

Much is already known as to the methods of diagnosing and, it is to be hoped, of predicting advancing age in the laboratory studies of lipoprotein fractions, cholesterol levels and other aspects of atherosclerosis, currently so popular. However, the actual practical utilization of such research is still in the future.



In addition to such obvious sources of research data in physiology and psychology, many other sources may provide research to aid in the solution of this growing, medical problem. Typical of such sources are experiments which deal with the life span of the exotic little rotifer[5]. The findings reported indicate that maternal age directly influences the longevity of the rotifer. This has a counterpart in the well-known fact that early born children have a tendency to live longer than those born to parents of advanced age.

Sociological studies, likewise, may prove helpful. Modern society has forced man to abdicate being complete master of his own destiny. Society places increasing amounts of responsibility on youth until, ultimately, they cannot carry that burden if they are to meet their normal biological responsibilities, such as being parents. Likewise, this shift of responsibility overtakes the labor pool of youth, while producing economic disaster for those of advancing age and causing the loss of self-respect of the elderly. Much is lost to society when it fails to utilize the talents and abilities of everyone, literally from the cradle to the grave. Although it is easier to apply chronological age rather than measure physiological and psychological manifestation of aging, and, although chronological age barriers are deeply established in cultural tradition, this is a stifling concept that must be overthrown.

These are only hints at the possibilities of biological, physiological, sociological and psychological areas of research and of the pressing need for such studies. The growing problem of pilot aging only intensifies the need for research in all the problems of aging. The problem of the older pilot will increasingly be brought to the attention of the private practitioners of medicine and surgery.

TABLE 2—CIVILIAN PILOTS ABOVE 60 YEARS OF AGE*

	1954	1955**	1960**
Airline Pilots	35	53	188
Commercial Pilots	257	344	1,212
Private Pilots	1,145	1,412	3,606
Total	1,437	1,809	5,006

*Chart prepared from CAA data supplied by W. R. Stovall
**Projected figures based on current trends.

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